



[4910-13]

## DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Interim Policy, FAA Review of Solar Energy System Projects on Federally Obligated Airports

**AGENCY:** Federal Aviation Administration (FAA), DOT

**ACTION:** Notice of Interim Policy; opportunity to comment.

**SUMMARY:** This notice establishes interim FAA policy for proposals by sponsors of federally obligated airports to construct solar energy systems on airport property. FAA is adopting an interim policy because it is in the public interest to enhance safety by clarifying and adding standards for measuring ocular impact of proposed solar energy systems which are effective upon publication. FAA will consider comments and make appropriate modifications before issuing a final policy. The policy applies to any proposed on-airport solar energy system that has not received from the FAA either an unconditional airport layout plan approval or a “no objection” finding on a Notice of Proposed Construction or Alteration Form 7460-1.

**DATES:** The effective date of this interim policy is **[Insert date of publication]**.

Comments must be received by [Insert date 30 days after date of publication in the Federal Register].

**ADDRESSES:** You can get an electronic copy of the interim policy and the comment form on the FAA Airports Web site at <http://www.faa.gov/airports/environmental/>.

You can submit comments using the Comments Matrix, using any of the following methods:

Electronic Submittal to the FAA: Go to <http://www.faa.gov/airports/environmental/> and follow the instructions for sending your comments electronically.

Mail: FAA Office of Airports, Office of Airport Planning and Programming, Routing Symbol APP-400, 800 Independence Avenue, SW., Room 615, Washington, DC 20591. Please send two copies.

Fax: 1-202-267-5302.

Hand Delivery: To FAA Office of Airports, Office of Airport Planning and Programming, Routing Symbol APP-400, 800 Independence Avenue, SW., Room 615, Washington, DC 20591; between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays. Please provide two copies.

For more information on the notice and comment process, see the **SUPPLEMENTARY INFORMATION** section of this document.

Privacy: We will post all comments we receive, without change, to <http://www.faa.gov/airports/environmental/>, including any personal information you provide.

Comments Received: To read comments received, go to <http://www.faa.gov/airports/environmental/> at any time.

**FOR FURTHER INFORMATION CONTACT:** Ralph Thompson, Manager, Airport Planning and Environmental Division, APP-400, Federal Aviation Administration, 800 Independence Ave, SW., Washington, DC 20591, telephone (202) 267-3263; facsimile (202) 267-5257; email: [ralph.thompson@faa.gov](mailto:ralph.thompson@faa.gov).

**SUPPLEMENTARY INFORMATION:** The FAA invites interested persons to join in this notice and comment process by filing written comments, data, or views. The most helpful

comments reference a specific portion of the proposal, explain the reason for any recommended change, and include supporting data.

### **Availability of Documents**

You can get an electronic copy of this interim policy by visiting the FAA's Airports Web page at <http://www.faa.gov/airports/environmental/>.

## **Authority for the Policy**

This notice is published under the authority described in Subtitle VII, part B, chapter 471, section 47122 of title 49 United States Code.

## **Background**

There is growing interest in installing solar photovoltaic (PV) and solar hot water (SHW) systems on airports. While solar PV or SHW systems (henceforth referred to as solar energy systems) are designed to absorb solar energy to maximize electrical energy production or the heating of water, in certain situations the glass surfaces of the solar energy systems can reflect sunlight and produce glint (a momentary flash of bright light) and glare (a continuous source of bright light). In conjunction with the United States Department of Energy (DOE), the FAA has determined that glint and glare from solar energy systems could result in an ocular impact to pilots and/or air traffic control (ATC) facilities and compromise the safety of the air transportation system. While the FAA supports solar energy systems on airports, the FAA seeks to ensure safety by eliminating the potential for ocular impact to pilots and/or air traffic control facilities due to glare from such projects.

The FAA established a cross-organizational working group in 2012, to establish a standard for measuring glint and glare, and clear thresholds for when glint and glare would impact aviation safety. The standards that this working group developed are set forth in this notice.

A sponsor of a federally-obligated airport must request FAA review and approval to depict certain proposed solar installations (e.g., ground-based installations and collocated installations

that increase the footprint of the collocated building or structure) on its airport layout plan (ALP), before construction begins.<sup>1</sup> A sponsor of a federally-obligated airport must notify the FAA of its intent to construct any solar installation<sup>2</sup> by filing FAA Form 7460-1, “Notice of Proposed Construction or Alteration” under 14 CFR Part 77 for a Non-Rulemaking case (NRA)<sup>3,4</sup>. This includes the intent to permit airport tenants, including Federal agencies, to build such installations. The sponsor’s obligation to obtain FAA review and approval to depict certain proposed solar energy installation projects at an airport is found in 49 U.S.C. 47107(a)(16) and Sponsor Grant Assurance 29, “Airport Layout Plan.” Under these latter provisions, the sponsor may not make or permit any changes or alterations in the airport or any of its facilities which are not in conformity with the ALP as approved by the FAA and which might, in the opinion of the FAA, adversely affect the safety, utility or efficiency of the airport.

Airport sponsors and project proponents must comply with the policies and procedures in this notice to demonstrate to the FAA that a proposed solar energy system will not result in an ocular impact that compromises the safety of the air transportation system. This process enables the FAA to approve amendment of the ALP to depict certain solar energy projects or issue a “no

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<sup>1</sup> FAA Technical Guidance for Evaluating Selected Solar Technologies on Airports, Section 2.3.5, states that “solar installations of any size, located on an airport, that are not collocated on an existing structure (i.e., roof of an existing building) and require a new footprint, need to be shown on the Airport Layout Plan (ALP). Collocated solar installations need to be shown on the ALP only if these installations substantially change the footprint of the collocated building or structure. *Available at:* [http://www.faa.gov/airports/environmental/policy\\_guidance/media/airport\\_solar\\_guide\\_print.pdf](http://www.faa.gov/airports/environmental/policy_guidance/media/airport_solar_guide_print.pdf). Title 49 of the United States Code (USC), sec. 47107(a), requires, in part, a current ALP approved by the FAA prior to the approval of an airport development project. See Grant Assurance No. 29, AC No. 150/5070-6B, and FAA Order No. 5100.38.

<sup>2</sup> Any solar installation means any ground-based solar energy installation and those solar energy installations collocated with a building or structure (i.e., rooftop installations).

<sup>3</sup> FAA Technical Guidance for Evaluating Selected Solar Technologies on Airports Section 3.1 reads in part “All solar projects at airports must submit to FAA a Notice of Proposed Construction Form 7460...” This section further states “Even if the project will be roof mounted ... the sponsor must still submit a case” [i.e., file a Form 7460-1].

<sup>4</sup> The requirements of this policy are not mandatory for a proposed solar installation that is not on an airport and for which a form 7460-1 is filed under part 77 and is studied under the Obstruction Evaluation Program. However, the FAA urges proponents of off-airport solar-installations to voluntarily implement the provisions in this policy.

objection” finding to a filed 7460-1 form. The FAA expects to continue to update these policies and procedures as part of an iterative process as new information and technologies become available.

Solar energy systems located on an airport that is not federally-obligated or located outside the property of a federally-obligated airport are not subject to this policy. Proponents of solar energy systems located off-airport property or on non-federally-obligated airports are strongly encouraged to consider the requirements of this policy when siting such systems.

This interim policy clarifies and adds standards for measurement of glint or glare presented in the 2010 Technical Guidance document. Later this year the FAA plans to publish an update to the “Technical Guidance for Evaluating Selected Solar Technologies on Airports,” (hereinafter referred to as “Technical Guidance”) dated November 2010. This update to the technical guidance will include the standards for measuring glint and glare outlined in this notice. It will also provide enhanced criteria to ensure the proper siting of a solar energy installation to eliminate the potential for harmful glare to pilots or air traffic control facilities.

In advance of the planned update, as part of this Notice, we are clarifying one aspect of the Technical Guidance relating to airport sponsor and FAA responsibilities for evaluating the potential for solar energy systems installed on airports to either block, reflect, or disrupt radar signals, NAVAIDS, and other equipment required for safe aviation operations. Section 3.1 of the Technical Guidance, entitled “Airspace Review,” correctly states that this role is exclusively the responsibility of FAA Technical Operations (Tech Ops). However subsection 3.1.3, “System Interference,” states: “[s]tudies conducted during project siting should identify the location of radar transmission and receiving facilities and other NAVAIDS, and determine locations that

would not be suitable for structures based on their potential to either block, reflect, or disrupt radar signals.”

Reading the two sections together, what is meant is that the airport sponsor, in siting a proposed solar energy system, is responsible for limiting the potential for inference with communication, navigation, and surveillance (CNS) facilities. The sponsor should do so by ensuring that solar energy systems remain clear of the critical areas surrounding CNS facilities. FAA Advisory Circular (AC) 5300-13, “Airport Design,” Chapter 6, defines the critical areas for common CNS facilities located on an airport. Sponsors may need to coordinate with FAA Technical Operations concerning CNS facilities not in AC 5300-13. As stated in Section 3.1, the FAA is responsible for evaluating if there are any impacts to CNS facilities. The FAA will conduct this review after the Form 7460-1 is filed for the construction of a new solar energy system installation on an airport. In summary, airport sponsors do not need to conduct studies on their own to determine impacts to CNS facilities when siting a solar energy system on airport. Section 3.1.3 will be revised accordingly in the next version of the Technical Guidance.

### **Interim Policy Statement**

The following sets forth the standards for measuring ocular impact, the required analysis tool, and the obligations of the Airport Sponsor when a solar energy system is proposed for development on a federally-obligated airport.

The FAA is adopting an interim policy because it is in the public interest to enhance safety by clarifying and adding standards for measuring ocular impact of proposed solar energy systems. FAA will consider comments and make appropriate modifications before issuing a final policy in

a future Federal Register Notice. The policy applies to any proposed solar energy system that has not received unconditional airport layout plan approval (ALP) or a “no objection” from the FAA on a filed 7460-1, Notice of Proposed Construction or Alteration.

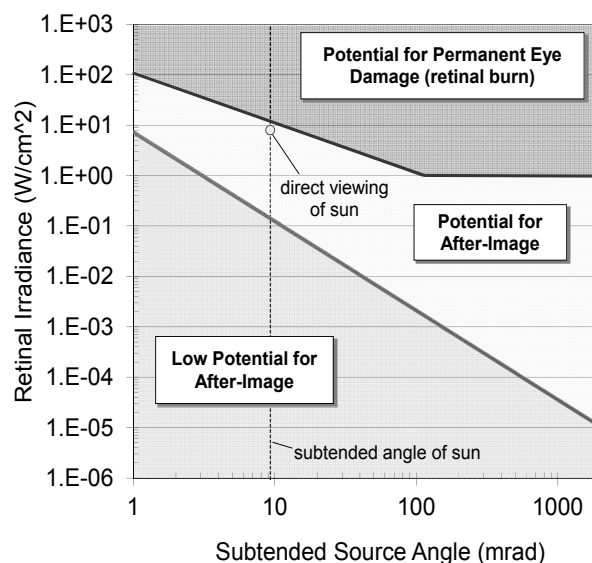
### **Standard for Measuring Ocular Impact**

FAA adopts the *Solar Glare Hazard Analysis Plot* shown in Figure 1 below as the standard for measuring the ocular impact of any proposed solar energy system on a federally-obligated airport. To obtain FAA approval to revise an airport layout plan to depict a solar installation and/or a “no objection” to a Notice of Proposed Construction Form 7460-1, the airport sponsor will be required to demonstrate that the proposed solar energy system meets the following standards:

1. No potential for glint or glare in the existing or planned Airport Traffic Control Tower (ATCT) cab, and
2. No potential for glare or “low potential for after-image” (shown in green in Figure 1) along the final approach path for any existing landing threshold or future landing thresholds (including any planned interim phases of the landing thresholds) as shown on the current FAA-approved Airport Layout Plan (ALP). The final approach path is defined as two (2) miles from fifty (50) feet above the landing threshold using a standard three (3) degree glidepath.

Ocular impact must be analyzed over the entire calendar year in one (1) minute intervals from when the sun rises above the horizon until the sun sets below the horizon.

**Figure 1**



Solar Glare Ocular Hazard Plot: The potential ocular hazard from solar glare is a function of retinal irradiance and the subtended angle (size/distance) of the glare source. It should be noted that the ratio of spectrally weighted solar illuminance to solar irradiance at the earth's surface yields a conversion factor of  $\sim 100$  lumens/W. Plot adapted from Ho et al., 2011.

Chart References: Ho, C.K., C.M. Ghanbari, and R.B. Diver, 2011, Methodology to Assess Potential Glint and Glare Hazards from Concentrating Solar Power Plants: Analytical Models and Experimental Validation, J. Solar Energy Engineering, August 2011, Vol. 133, 031021-1 – 031021-9.

## Tool to Assess Ocular Impact

In cooperation with the DOE, the FAA is making available free-of-charge the *Solar Glare Hazard Analysis Tool* (SGHAT). The SGHAT was designed to determine whether a proposed solar energy project would result in the potential for ocular impact as depicted on the *Solar Glare Hazard Analysis Plot* shown above.

The SGHAT employs an interactive Google map where the user can quickly locate a site, draw an outline of the proposed solar energy system, and specify observer locations (Airport Traffic Control Tower cab) and final approach paths. Latitude, longitude, and elevation are automatically recorded through the Google interface, providing necessary information for sun

position and vector calculations. Additional information regarding the orientation and tilt of the solar energy panels, reflectance, environment, and ocular factors are entered by the user.

If glare is found, the tool calculates the retinal irradiance and subtended source angle (size/distance) of the glare source to predict potential ocular hazards ranging from temporary after-image to retinal burn. The results are presented in a simple, easy-to-interpret plot that specifies when glare will occur throughout the year, with color codes indicating the potential ocular hazard. The tool can also predict relative energy production while evaluating alternative designs, layouts, and locations to identify configurations that maximize energy production while mitigating the impacts of glare.

Users must first register for the use of the tool at this web address: [www.sandia.gov/glare](http://www.sandia.gov/glare)

### **Required Use of the SGHAT**

As of the date of publication of this interim policy, the FAA requires the use of the SGHAT to demonstrate compliance with the standards for measuring ocular impact stated above for any proposed solar energy system located on a federally-obligated airport. The SGHAT is a validated tool specifically designed to measure glare according to the *Solar Glare Hazard Analysis Plot*. All sponsors of federally-obligated airports who propose to install or to permit others to install solar energy systems on the airport must attach the SGHAT report, outlining solar panel glare and ocular impact, for each point of measurement to the Notice of Proposed Construction Form 7460-1. The FAA will consider the use of alternative tools or methods on a case-by-case basis. However, the FAA must approve the use of an alternative tool or method prior to an airport sponsor seeking approval for any proposed on-airport solar energy system.

The alternative tool or method must evaluate ocular impact in accordance with the *Solar Glare Hazard Analysis Plot*.

Please contact the Office of Airport Planning and Programming, Airport Planning and Environmental Division, APP-400, for more information on the validation process for alternative tools or methods.

Airport sponsor obligations have been discussed above under Background. We caution airport sponsors that under preexisting airport grant compliance policy, failure to seek FAA review of a solar installation prior to construction could trigger possible compliance action under 14 CFR Part 16, “Rules of Practice for Federally-Assisted Airport Enforcement Proceedings.” Moreover, if a solar installation creates glare that interferes with aviation safety, the FAA could require the airport to pay for the elimination of solar glare by removing or relocating the solar facility.

Issued in Washington, DC on September 27, 2013.

Benito De Leon,

Director, Office of Airport Planning and Programming.

